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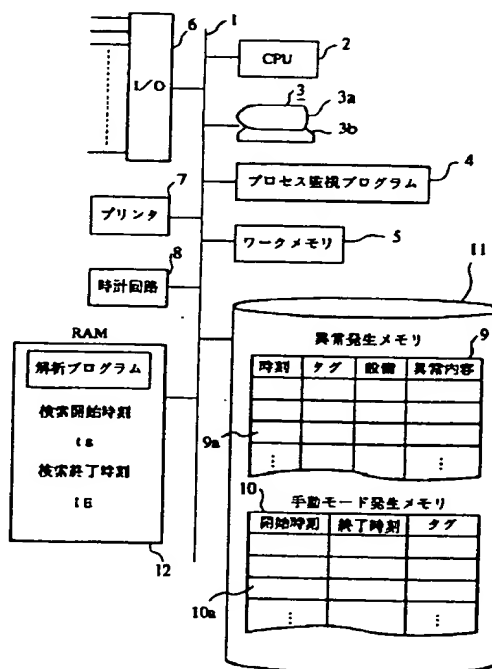
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(54)【発明の名称】 プロセス監視装置の警報解析装置

(57)【要約】

【目的】 プラントを構成する各設備のプロセス状態を監視するプロセス監視装置において検出され時系列的に記憶されている異常発生情報を後から読出して解析する。

【構成】 外部から検索期間 (t_s , t_e) を指定した異常解析指令に応動して、異常発生メモリ9に記憶された該当検索期間内に入る各異常発生時刻の異常発生情報を抽出し、抽出された各異常発生情報に対して外部から指定されたパラメータ毎に集計して解析する。そして、この集計解析結果を表示装置3aにグラフィック表示する。



握できる。よって、異常原因究明や発生が予想される異常に対しては予め予防措置を講ずることが可能となる。

【0013】

【実施例】以下本発明の一実施例を図面を用いて説明する。図1は実施例の警報解析装置が組込まれたプロセス監視装置の概略構成を示すブロック図である。

【0014】バスライン1に対して各種情報処理を実行するCPU2、CRT表示器3aとキーボード3bとからなるマンマシン装置3、プロセス監視プログラム等の固定データを記憶するROM4、各種可変データを記憶するワークメモリが形成されたRAM5、プラントを構成する各設備の各機器からそれぞれプロセスデータが入力される入力ポート6、プロセス監視結果を印紙出力するプリンタ7等が接続されている。

【0015】さらに、バスライン1には、現在時刻を計時する時計回路8、異常発生メモリ9及び手動モード発生メモリ10が形成された例えばHDD等の補助記憶装置11及び異常情報を解析するための各種情報を記憶するRAM12等が接続されている。

【0016】補助記憶装置11の異常発生メモリ9内には、異常が発生する毎に、発生時刻と、異常発生機器を示すタグと、該当タグが所属する設備と、異常内容とからなる異常発生情報を時系列的に記憶する複数の領域9aが形成されている。また、手動モード発生メモリ10内には、機器（タグ）を手動モードで操作した場合における手動モードの開始時刻と終了時刻とタグ名称とからなる手動モード発生情報を時系列的に記憶する複数の領域10aが形成されている。

【0017】また、RAM12内には、異常情報を解説する解析プログラムと異常発生メモリ9及び手動モード発生メモリ10内の各異常情報及び手動モード発生情報を抽出する場合の検索開始時刻 t_1 、や検索終了時刻 t_2 が記憶される。

【0018】このような構成のプロセス監視装置において、CPU2は、ROM4のプロセス監視プログラムに従って入力ポート6に入力されている各設備の各機器（タグ）からのプロセスデータ（プロセス量PV）を讀取って所定の処理を実行した後、CRT表示器3aに表示する。同時に讀取ったプロセスデータに異常が発生しているか否かを判定して、異常発生を検出した場合は、時計回路8から讀取った発生時刻、発生タグ、発生設備、異常内容からなる異常発生情報をCRT表示器3aに警告表示し、かつ補助記憶装置11の異常発生メモリ9の先頭の空き領域9aに書き込む。

【0019】また、CPU2は、操作者がタグ（機器）の動作モードを自動モードから手動モードへ切換えて何等かの操作を実行して、その後元の自動モードに戻した場合は、その手動モードの開始時刻と終了時刻と対象タグ名とからなる手動モード発生情報を補助記憶装置11の手動モード発生メモリ10の先頭の空き領域10aに

書き込む。

【0020】さらに、CPU2は、操作者又は保守管理者によるキーボード3b操作によって異常発生情報解析指令が入力されると、前記RAM12の解析プログラムに従って図2の流れ図に示す集計解析処理を実行する。

【0021】流れ図が開始され、キーボード3bから総合表示指令が入力されると、図3に示す総合表示処理を実行する。図3の流れ図において、時計回路6から現在時刻 t_0 を讀取ってRAM12の検索終了時刻 t_2 に設定する（ $t_2 = t_0$ ）。次に、現在時刻 t_0 から1時間前の時刻を算出して、この1時間前の時刻を検索開始時刻 t_1 に設定する。そして、異常発生メモリ9内の各領域9aの異常発生情報のうち、異常発生時刻が検索開始時刻 t_1 から検索終了時刻 t_2 の検索期間内に該当するすべての異常発生情報を読出す（Q1）。

【0022】そして、讀出した各異常発生情報を設備毎に集計する。さらに、各設備毎に異常種別毎に集計する。それぞれの集計結果をグラフ表示するためのフォーマットに編集する。編集された結果を図6に示すようにCRT表示器3aにグラフィック表示する。

【0023】Q2において、設備毎の異常発生状況が表示された状態において、検索の開始年月日がキー入力されると、この入力された開始年月日をRAM12の検索開始時刻 t_1 に設定する。

【0024】次に、表示画面の「日」を例えばマウスやタッチペンで指定すると、前記RAM12の検索開始時刻 t_1 に1日分の時間を加算した時刻をRAM12の検索終了時刻 t_2 に設定する。同様に、表示画面の「週」を指定すると、前記RAM12の検索開始時刻 t_1 に1週分の時間を加算した時刻をRAM12の検索終了時刻 t_2 に設定する。さらに、表示画面の「月」を指定すると、前記RAM12の検索開始時刻 t_1 に1月分の時間を加算した時刻をRAM12の検索終了時刻 t_2 に設定する。

【0025】新たな検索終了時刻 t_2 の設定処理が終了すると、Q1へ戻り、今回表示画面から設定された検索開始時刻 t_1 から検索終了時刻 t_2 までの検索期間内に存在する各異常発生情報を異常発生メモリ9から読出す。

【0026】したがって、この総合表示処理においては、図6に示すように、任意に指定した時間、日、週、月等の検索期間内において発生した各設備毎の各異常の種類毎に発生回数がグラフィック表示される。

【0027】なお、異常種別を示す「PH」及び「PL」は各機器からのプロセス値（PV）が許容上限値PH及び許容下限値PLで定まる許容範囲を外れたことを示し、「DV」は前記プロセス値の零点変動値が許容限界を越えたことを示し、「ΔPV」はプロセス値の変化量が基準値から許容限界以上離れたことを示す。さらに、「MH」及び「ML」は各機器に対する操作値（M

V) が許容上限値MH及び許容下限値MLで定まる許容範囲を外れたことを示す。

【0028】図2のP2において、キーボード3bから傾向(トレンド)表示指令が入力されると、図4に示す傾向表示処理を実行する。図4の流れ図において、キーボード3bから設備名が入力され、さらに、キーボード3bから検索開始時刻 t_0 と検索終了時刻 t_1 とからなる検索期間が入力されると、Q4へ進み、異常発生メモリ9内の該当検索期間に所属し、かつ指定された設備に対応する各異常発生情報を読出す。次に、読出した各異常発生情報を発生日別に集計する。さらに、各発生日内において、各異常種類毎に集計する。そして、所定のフォーマットに編集して、図7に示すようにCRT表示器3bにグラフィック表示する。

【0029】Q5において、各日毎の異常発生状況が表示された状態において、件数レンジ変更を指定すると、レンジ変更の操作案内が表示される。この操作案内に従って、Y軸(件数)の表示レンジを変更して表示する。

【0030】なお、図示しないが、X軸(日付)方向のレンジ(日付間隔)を変更することも可能である。したがって、この傾向表示処理においては、図7に示すように、任意に指定した設備における各異常の各日毎に発生状況の傾向が表示される。したがって、時間経過と共に該当異常の発生頻度が増加する傾向にあるのか、減少する傾向にあるのかを適格に把握できる。

【0031】さらに、発生した異常が周期的に発生する異常であるか否かを把握できる。周期的に発生する異常の場合においては、次に発生する時期を予測できる。よって、予測された時期に該当異常に対する予防措置を予め講ずることが可能となる。

【0032】図2のP3において、キーボード3bからタグ(機器)別表示指令が入力されると、タグ別表示処理を実行する。このタグ別表示処理の詳細流れ図は省略するが、前述した傾向表示処理と同様に、検索期間及び対象設備名をキーボード3bからキー入力すると、異常発生メモリ9内の該当する各異常情報が読出されて、各タグ(機器)毎に、各異常種類毎に発生回数が集計されて、所定のフォーマットに編集されて、図8に示すようにCRT表示器3aにグラフィック表示される。

【0033】なお、各異常種類毎に色分け表示する。また、表示された画面の[期間]をライトペンで示すと、図6に示したような検索期間変更のメニュー画面が表示され、必要に応じて、検索期間を任意に変更できる。また、表示画面の[PH/PL][DV][ΔPV][MH/ML]の各異常種類名は、タッチペンで接触する毎に表示状態が反転/正転し、反転状態の異常種類の発生回数は画面から削除されて、画面には該当異常種類を除いた残りの異常情報のみで作成された発生件数がグラフィック表示される。

【0034】図9は、異常が発生していた累積時間をグ

ラフィック表示したものであり、図8のタグ別表示処理と同様に、画面の[期間]のタッチ操作で検索期間及び累積時間に組込む異常種類を任意に変更可能である。

【0035】さらに、図2のP4において、キーボード3bから手動(M)モード表示指令が入力されると、図5に示す手動(M)モード表示処理を実行する。図5の流れ図が開始され、今回検索すべきタグ(機器)名称が入力され(Q6)、検索期間が入力されると、手動モード発生メモリ10内の指定された検索期間で、かつ指定されたタグ(機器)に関する手動モード発生情報を読出す(Q7)。

【0036】そして、Q8にてキーボード3bから発生回数表示指定が入力されると、先に読出した手動モード発生情報を、各タグ(機器)別に発生回数を集計し、所定のフォーマットに編集して、図10に示すように、CRT表示器3aにグラフィック表示する。

【0037】また、Q9において、キーボード3bから累積時間表示指定が入力されると、先に読出した手動モード発生情報を、各タグ(機器)別に発生開始時刻から発生終了時刻までの各手動モード継続時間 T_i を加算した累積時間 T を算出する。そして、これらを所定のフォーマットに編集して、図11に示すように、CRT表示器3aにグラフィック表示する。

【0038】このように、各タグ(機器)毎に、操作者の手動操作回数や手動操作時間の累積値を簡単に把握できるので、例えば極端に手動操作回数や手動操作時間が長いタグ(機器)に対しては、潜在的にタグ(機器)自体に何等かの欠陥が存在すると判断して、保守点検の対象とすることができる。

【0039】このような構成の警報解析装置においては、外部記憶装置11内の異常発生メモリ9に発生時系列的に記憶保持されている各異常発生情報、及び手動モード発生メモリ10に時系列的に記憶保持されている手動モード発生情報を、設備別、タグ(機器)別、故障種類別、発生日時別、発生期間別等の各種のパラメータを指定して集計してCRT表示器3aにグラフィック表示させることが可能である。

【0040】したがって、ただ単に個々に発生した異常を解析するのではなくて、異常の発生回数や発生場所、発生時刻等を統計的に把握できるので、異常発生原因を短時間で究明できると共に、プロセス監視装置の点検保守作業における重点点検項目の選定にも役立ち、点検保守作業の作業能率を向上できる。

【0041】

【発明の効果】以上説明したように本発明の警報解析装置によれば、異常発生メモリに時系列的に記憶された異常発生情報を検索期間及びパラメータを指定して集計解析を行い、各設備毎又は異常種類毎に統計的な異常発生状況を簡単な操作で表示装置にグラフィック表示させるている。したがって、異常原因究明を短時間で行うこと

ができ、かつ周期的に発生する異常に対しては予防措置を簡単に講ずることができ、操作員や保守管理要員の心理的負担を大幅に軽減でき、かつプロセス監視装置全体の信頼性を向上できる。

【図面の簡単な説明】

【図 1】 本発明の一実施例に係わる警報解析装置が組込まれたプロセス監視装置の概略構成を示すブロック図

【図 2】 同実施例警報解析装置の動作を示す流れ図

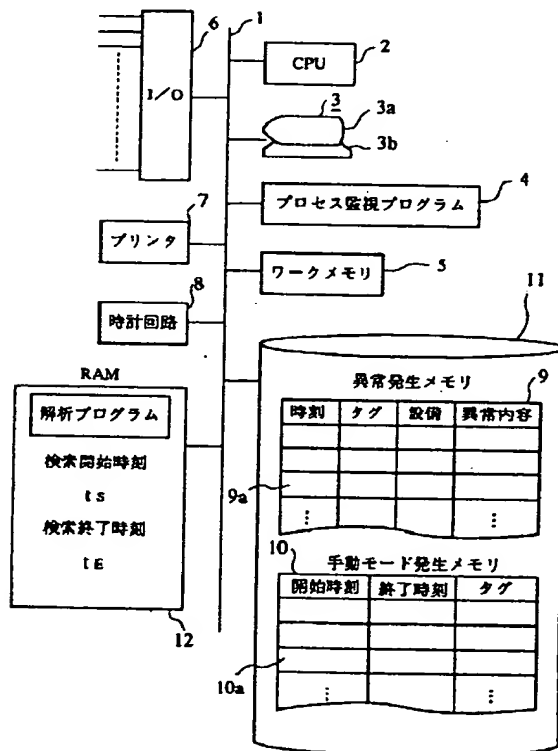
【図 3】 同実施例警報解析装置の総合表示処理動作を示す流れ図

【図 4】 同実施例装置の傾向表示処理動作を示す流れ図

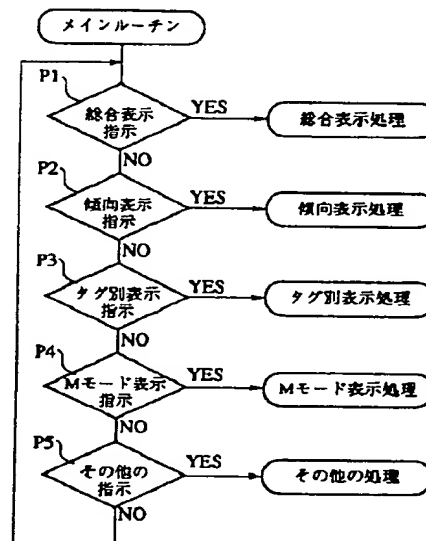
【図 5】 同実施例装置の手動モード表示処理動作を示す流れ図

【図 6】 同実施例装置の CRT 表示器の表示内容を示す

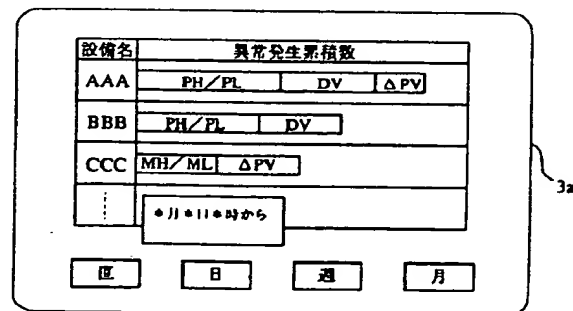
【図 1】



【図 2】



【図 6】



*す図

【図 7】 同実施例装置の CRT 表示器の表示内容を示す図

【図 8】 同実施例装置の CRT 表示器の表示内容を示す図

【図 9】 同実施例装置の CRT 表示器の表示内容を示す図

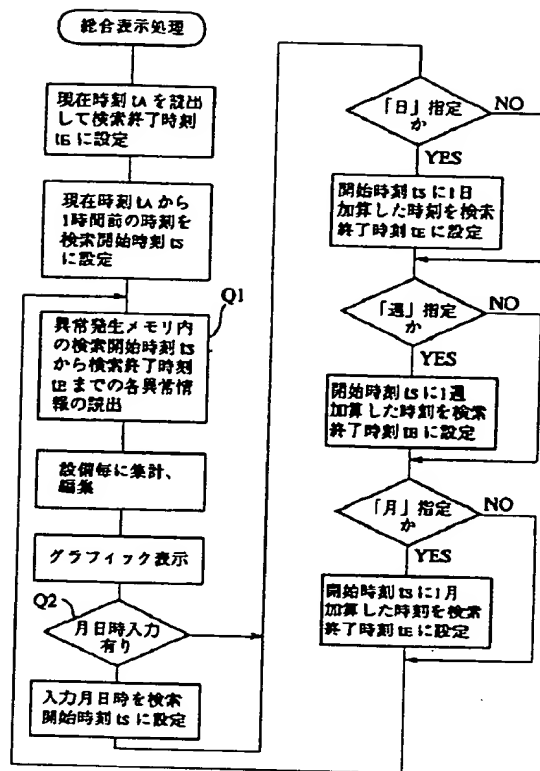
【図 10】 同実施例装置の CRT 表示器の表示内容を示す図

10 【図 11】 同実施例装置の CRT 表示器の表示内容を示す図

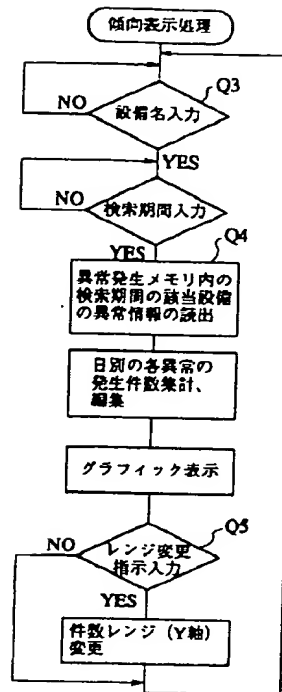
【符号の説明】

2…CPU、3 a…CRT 表示器、3 b…キーボード、7…プリンタ、8…時計回路、9…異常発生メモリ、10…手動モード発生メモリ。

【図3】

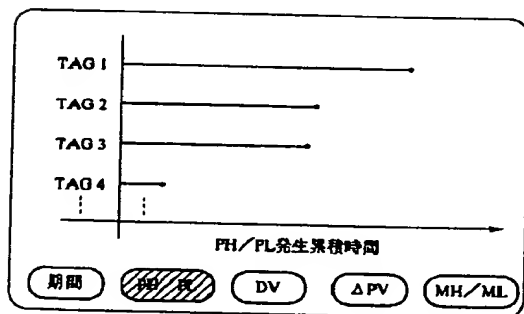


【図4】

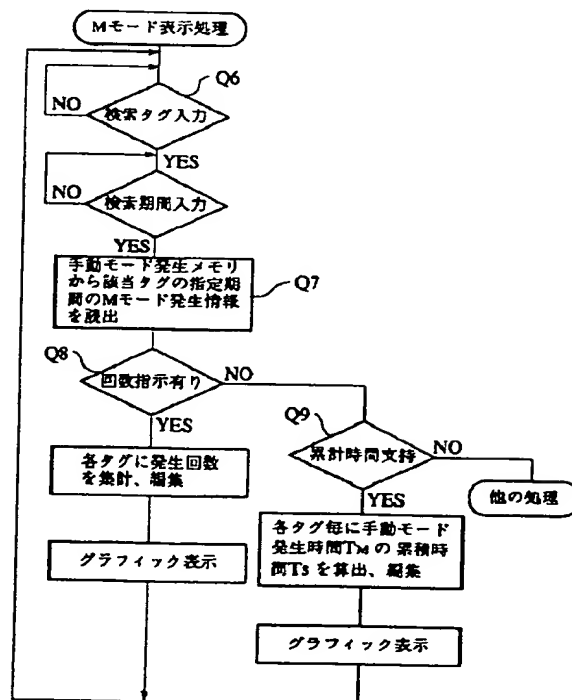
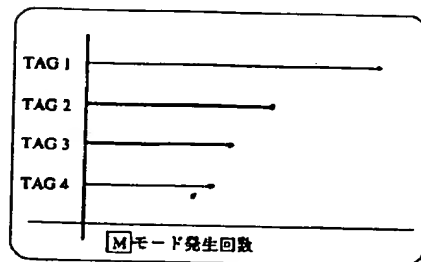


【図5】

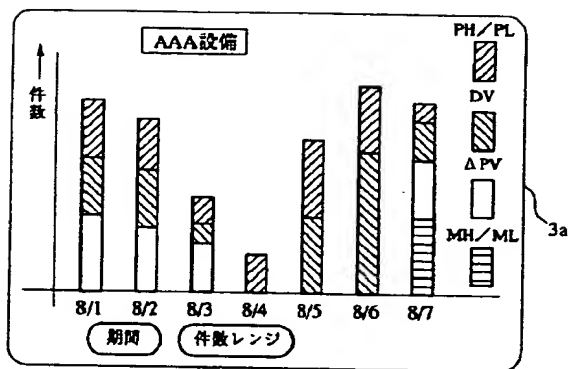
【図9】



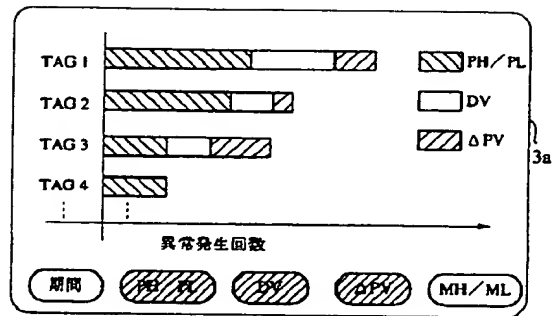
【図10】



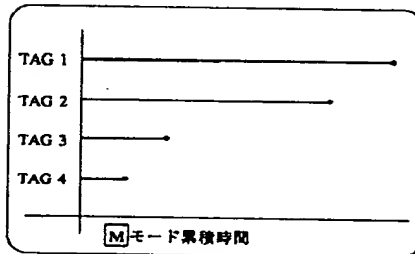
【図7】



【図8】



【図11】



PATENT ABSTRACTS OF JAPAN

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(71)Applicant : TOSHIBA CORP

(22)Date of filing : 01.12.1993

(72)Inventor : OKUNO CHIEKO

(54) ALARM ANALYZING DEVICE FOR PROCESS MONITORING DEVICE

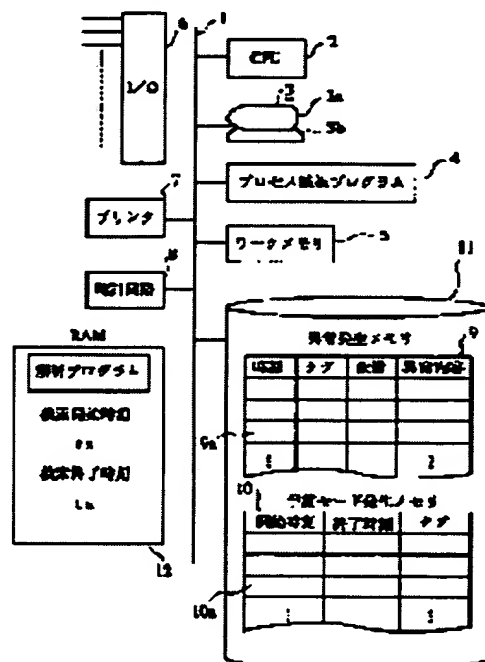
(57)Abstract:

PURPOSE: To clear up the cause of abnormality in a short time by summing up and analyzing abnormality occurrence information stored in an abnormality occurrence memory as designating a retrieving period and a parameter, and displaying graphically that result.

CONSTITUTION: When a CPU 2 detects the abnormality occurrence of process data, it alarm-displays the abnormality occurrence information consisting of the time of occurrence, an occurring tag, occurring equipment and abnormal contents on a CRT display device 3a, and besides, it writes it in the abnormality occurrence memory 9 of an auxiliary storage device 11.

When an abnormality occurrence information analyzing command is inputted by keyboard 3b operation, the CPU 2 reads the abnormality occurrence information whose time of occurrence corresponds to the prescribed retrieving period out of the abnormality occurrence memory 9, and sums up each read out abnormality information as classifying it by every equipment. Further,

it sums up the information as classifying it by every equipment and every kind of the abnormality, and edits it into format for summing up graphically each summed result. Then, the edited result is graphic-displayed on the CRT display device 3a.



CLAIMS

[Claim(s)]

[Claim 1] Process-monitoring equipment which carries out the warning output of this abnormality, and is registered into the generating time series target at heterology memory by making the generating time of abnormalities, a generating facility, and an unusual content into heterology information if the process state of each facility which constitutes a plant characterized by providing the following is supervised and abnormalities are detected. A heterology information extraction means to extract the heterology information on each heterology time that it enters within the applicable retrieval time memorized by the aforementioned heterology memory following the unusual analysis instructions which specified retrieval time from the exterior. A heterology information total analysis means specified from the outside to each of this extracted heterology information to total and analyze for every parameter. The total analysis result display means which carries out graphical display of the total analysis result by this heterology information total analysis means to display.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the alarm analysis equipment of the process-monitoring equipment which analyzes statistically each abnormality detected especially and carries out a display output, for example with respect to the process-monitoring equipment which supervises the process state of each facility which constitutes a plant.

[0002]

[Description of the Prior Art] In the process-monitoring equipment which supervises the process state of each facility which constitutes a plant, detection of abnormalities the case where the amount process variable of processes of each facility separates from tolerance, when the control input MV to each facility separates from tolerance carries out the alarm display of the unusual generating, for example to a CRT display machine. Moreover, in addition to an alarm display, beep sound is outputted. The contents of a display in this case are with unusual generating time, an unusual generating facility, and unusual contents.

[0003] Moreover, the unusual generating information which consists of the generating time of abnormalities and the generating facility which were detected, and unusual contents carries out storage maintenance serially to the auxiliary memory of the exteriors, such as a magnetic disk unit.

[0004] An engineer and a plant-maintenance manager read each unusual generating information serially memorized by auxiliary memory afterwards to the display screen of a CRT display machine, and can check the generating time of abnormalities, a generating facility, unusual contents, etc. That is, abnormalities arise [what] when and where and it can know correctly when it was recovered.

[0005] Moreover, the information on being set as the manual mode of each facility (for example, a specific device) depending on the kind of process-monitoring equipment etc. also carries out storage maintenance. A device is not an automatic mode, in order for the operator to have discovered a certain unusual generating to the applicable device, and to have switched to the manual mode from the automatic mode or to change a plant performance, being set as a manual mode changes a mode of operation into a manual mode temporarily, and it is considered to have carried out irregular operation.

[0006]

[Problem(s) to be Solved by the Invention] By carrying out storage maintenance of a heterology history or the manual-mode history of each device at auxiliary memory, as mentioned above, the generating history can be checked afterwards. However, although it was also important to study the cause of generating of the abnormalities caused in single shot, when studying unusual causes, like specific abnormalities with the high probability of occurrence of a certain specific abnormalities are in the inclination generated periodically, important information was not able to be acquired easily.

[0007] Moreover, in the conventional technique, although the thing which are easy to generate periodically and which it is related unusually, and the next heterology plain-gauze cone stage is predicted, and is lectured on a precaution as abnormalities do not occur beforehand was also important, since prediction of a generating stage did not stick, it was not able to lecture on a precaution target.

[0008] By making this invention in view of such a situation, specifying retrieval time and a parameter and enabling total analysis of the heterology information serially memorized by heterology memory Display can be made to indicate the statistical heterology situation by GURAFUUKU by easy operation for every facility and every unusual kind. Unusual cause investigation can be performed in a short time, and it can lecture on a precaution easily to the abnormalities caused periodically. It aims at offering the alarm analysis equipment of the process-monitoring equipment which can mitigate the mental burden of an operator or a maintenance control staff sharply, and can improve the reliability of the whole equipment.

[0009]

[Means for Solving the Problem] In order to cancel the above-mentioned technical problem, if the alarm analysis equipment of this invention supervises the process state of each facility which constitutes a plant and abnormalities are detected, it will be applied to the process-monitoring equipment which carries out the warning output of this abnormality, and is registered into the generating time series target at heterology memory by making the generating time of abnormalities, a generating facility, and an unusual content into heterology information.

[0010] And a heterology information extraction means to extract the heterology information on each heterology time that it enters within the applicable retrieval time memorized by heterology memory following the unusual analysis instructions which specified retrieval time from the exterior. It has a heterology information total analysis means specified from the outside to each extracted heterology information to total and analyze for every parameter, and the total analysis result display means which carries out graphical display of the total analysis result by the heterology information total analysis means to display.

[0011]

[Function] Thus, if it is constituted alarm analysis equipment, and an operator or a maintenance control person will specify parameters, such as an unusual main category and generating time exception, and will input unusual analysis instructions between patent periods and a facility exception, it will be extracted, will be totaled for every specified parameter, and a GURAFIKU indication of each unusual information which corresponds between the applicable patent periods in heterology memory will be given at display.

[0012] Therefore, an operator or a maintenance control person can grasp easily every unusual kind, generating frequency, a generating inclination for every facility, etc. Therefore, the thing for which unusual cause investigation and generating are expected and which receive unusually and lectures on a precaution beforehand becomes possible.

[0013]

[Example] One example of this invention is explained using a drawing below. Drawing 1 is the block diagram showing the outline composition of the process-monitoring equipment with which the alarm analysis equipment of an example was incorporated.

[0014] The printer 7 grade which carries out the stamp output of ROM4 which memorizes fixed data, such as CPU2 which performs various information processing to a bus line 1, the man-machine equipment 3 which consists of CRT display machine 3a and keyboard 3b, and a process-monitoring program, the input port 6 into which a process data is inputted, respectively from each device of each facility which constitutes the RAM5. plant in which the work memory which memorizes various variable datas was formed, and the process-monitoring result is connected.

[0015] Furthermore, the RAM12 grade which memorizes the various information for [which analyzes auxiliary memory 11 and unusual information, such as HDD, for example] the clock circuit 8, the heterology memory 9, and the manual-mode generating memory 10 which clock the present time having been formed is connected to the bus line 1.

[0016] In the heterology memory 9 of auxiliary memory 11, whenever abnormalities occur, two or more field 9a which memorizes serially the heterology information which consists of generating time, the tag in which a heterology device is shown, a facility with which an applicable tag belongs, and an unusual content is formed. Moreover, in the manual-mode generating memory 10, two or more field 10a which memorizes serially the manual-mode generating information which consists of the start time, finish time, and tag name of a manual mode at the time of operating a device (tag) by the manual mode is formed.

[0017] Moreover, reference start time tS in the case of extracting each unusual information and manual-mode generating information in the analyzer which explains unusual information, the heterology memory 9, and the manual-mode generating memory 10 in RAM12 Reference finish time tE It memorizes.

[0018] In the process-monitoring equipment of such composition, after CPU2 reads the process data (the amount process variable of processes) from each device (tag) of each facility inputted into input port 6 according to the process-monitoring program of ROM4 and performs predetermined processing, it is displayed on CRT display machine 3a. the generating time read in

the clock circuit 8 when it judged whether abnormalities occur and are in the process data read simultaneously and unusual generating was detected, a generating tag, a generating facility, and unusual contents — the alarm display of the unusual generating information [from] is carried out to CRT display machine 3a, and it writes in free-area 9a of the head of the unusual generating memory 9 of auxiliary memory 11

[0019] Moreover, CPU2 writes the manual-mode generating information which consists of the start time, finish time, and object tag name of the manual mode in free-area 10a of the head of the manual-mode generating memory 10 of auxiliary memory 11, when an operator switches the mode of operation of a tag (device) to a manual mode from an automatic mode, performs a certain operation and returns to the automatic mode of after that origin.

[0020] Furthermore, CPU2 will perform total analysis processing shown in the flow chart of drawing 2 according to the analyzer of the above RAM 12, if unusual generating information analysis instructions are inputted by keyboard 3b operation by the operator or the maintenance control person.

[0021] If a flow chart is started and a comprehensive display command is inputted from keyboard 3b, comprehensive display processing shown in drawing 3 will be performed. It sets to the flow chart of drawing 3, and is the present time t_A from the clock circuit 6. It reads and is the reference finish time t_E of RAM12. It sets up ($t_E = t_A$). Next, the present time t_A The time 1 hour before a shell is computed and it is the reference start time t_S about the time of this hour ago. It sets up. And the unusual generating time among the unusual generating detailed reports of each field 9a in the unusual generating memory 9 is the reference start time t_S . Shell reference finish time t_E All the unusual generating information that corresponds within retrieval time is read (Q1).

[0022] And each read unusual generating information is totaled for every facility. Furthermore, it totals for every unusual classification for every facility. Each total result is edited into the format for carrying out graphical representation. The edited result is indicated by GURAFIKU at CRT display machine 3a, as shown in drawing 6.

[0023] If it keys the start date of reference in the state where the unusual generating situation for every facility was displayed, in Q2, it is the reference start time t_S of RAM12 about this inputted start date. It sets up.

[0024] Next, if the [day] of the display screen is specified with a mouse or a touch pen, it is the reference start time t_S of the above RAM 12. It is the reference finish time t_E of RAM12 about the time adding the time of the part on the 1st. It sets up. Similarly, if the [week] of the display screen is specified, it is the reference start time t_S of the above RAM 12. It is the reference finish time t_E of RAM12 about the time adding the time for one week. It sets up. Furthermore, if the [moon] of the display screen is specified, it is the reference start time t_S of the above RAM 12. It is the reference finish time t_E of RAM12 about the time adding the time for January. It sets up.

[0025] new reference finish time t_E Reference start time t_S which returned to Q1 and was set up from the display screen this time after setting processing was completed from — reference finish time t_E up to — each unusual generating information which exists within retrieval time is read from the unusual generating memory 9

[0026] Therefore, in this comprehensive display processing, as shown in drawing 6, graphical display of the number of times of generating is carried out for every kind of each abnormality for every facility generated within retrieval time, such as a time . day specified arbitrarily, a week, and the moon.

[0027] In addition, it is shown that "PH" and "PL" which show an unusual kind separated from the tolerance in which the process value (process variable) from each device becomes settled in the permission upper limit PH and the permission lower limit PL, as for "DV", the zero-shift value of the aforementioned process value shows that tolerance was exceeded, and it is shown that the amount of process value changes separated "deltaprocess variable" from the reference value more than tolerance. Furthermore, it is shown that "MH" and "ML" separated from the tolerance in which the operation value (MV) over each device becomes settled in the permission upper limit MH and the permission lower limit ML.

[0028] In P2 of drawing 2 , if an inclination (trend) display command is inputted from keyboard 3b, trend-display processing shown in drawing 4 will be performed. in the flow chart of drawing 4 , a facility name inputs from keyboard 3b — having — further — keyboard 3b to reference start time tS Reference finish time tE from — if the becoming retrieval time is inputted, it progresses to Q4, and it will belong at the applicable retrieval time in the unusual generating memory 9, and each unusual generating information corresponding to the specified facility will be read Next, each read unusual generating information is totaled according to a generating day. Furthermore, it totals for every unusual kind within each generating day. And it edits into a predetermined format, and as shown in drawing 7 , graphical display is carried out to CRT display machine 3b.

[0029] In Q5, specification of number-of-cases range change displays operation guidance of range change in the state where the unusual generating situation for every day was displayed. According to this operation guidance, the display range of the Y-axis (number of cases) is changed and displayed.

[0030] In addition, although not illustrated, it is also possible to change the range (date interval) of the direction of the X-axis (date). Therefore, in this trend-display processing, as shown in drawing 7 , the inclination of a generating situation is displayed for every day of each abnormality in the facility specified arbitrarily. Therefore, it can grasp proper whether it is in the inclination which decreases whether it is in the inclination which the generating frequency of applicable abnormalities increases with time progress.

[0031] Furthermore, in generating periodically, the caused abnormalities can grasp whether it is unusual. The time to generate next in the case of the abnormalities caused periodically can be predicted. Therefore, it becomes possible to lecture on the precaution which receives unusually [relevance at the predicted time] beforehand.

[0032] In P3 of drawing 2 , if tag (device) another display command is inputted from keyboard 3b, display processing according to tag will be performed. Although the detail chart of display processing according to this tag is omitted Like the trend-display processing mentioned above, if retrieval time and an object facility name are keyed from keyboard 3b Each unusual information that it corresponds in the unusual generating memory 9 is read, and the number of times of generating is totaled by each tag (device) of every for every unusual kind, and it is edited into a predetermined format, and as shown in drawing 8 , graphical display is carried out to it at CRT display machine 3a.

[0033] In addition, it indicates by classification by color for every unusual kind. Moreover, if a light pen shows the [period] of the displayed screen, the menu screen of retrieval time change as shown in drawing 6 is displayed, and retrieval time can be changed arbitrarily if needed. Moreover, whenever each unusual kind name of [PH/PL] of the display screen, [DV],

[deltaprocess variable], and [MH/ML] contacts with a touch pen, a display state reverses / rotates it normally, the number of times of generating of the unusual kind of reversal state is deleted from a screen, and graphical display of the generating number of cases created only for the remaining unusual information except the applicable unusual kind is carried out to a screen.

[0034] Drawing 9 can carry out graphical display of the accumulation time when abnormalities had occurred, and can change arbitrarily the unusual kind included in retrieval time and accumulation time by touch operation of the [period] of a screen like display processing according to tag of drawing 8 .

[0035] Furthermore, in P4 of drawing 2 , if a (manual M) mode display command is inputted from keyboard 3b, (manual M) mode display processing shown in drawing 5 will be performed. If the flow chart of drawing 5 is started, the tag (device) name which should be searched this time is inputted (Q6) and retrieval time is inputted, the manual-mode generating information about the tag (device) which is the retrieval time when it was specified in the manual-mode generating memory 10, and was specified will be read (Q7).

[0036] and the manual-mode generating information previously read when the number-of-times display specification of generating was inputted from keyboard 3b in Q8 — each tag (device) — the number of times of generating is totaled independently, and it edits into a predetermined FE mat, and as shown in drawing 10 , graphical display is carried out to CRT display machine 3a

[0037] Q9 [moreover,] — setting — the accumulation timetable index finger from keyboard 3b

— the manual-mode generating information previously read when the law was inputted — each tag (device) — another — each manual-mode duration TM from a generating start time to a generating finish time Added accumulation time TS It computes. And these are edited into a predetermined format, and as shown in drawing 11 , graphical display is carried out to CRT display machine 3a.

[0038] Thus, since the accumulation value of an operator's number of times of a manual operation or manual operation time can be easily grasped to each tag (device) of every, to a tag (device) with for example extremely long number of times of a manual operation and manual operation time, it can judge to it that a certain defect exists in the tag (device) itself potentially, and can consider as the object of a maintenance dotted line.

[0039] Each heterology information by which storage maintenance is carried out on the generating time series target in the alarm analysis equipment of such composition at the heterology memory 9 in external storage 11, And it is possible to specify various kinds of parameters, such as a facility exception, a tag (device) exception, a failure kind exception, a generating time exception, and an exception during a nascent state, to total the manual-mode generating information by which storage maintenance is carried out serially in the manual-mode generating memory 10, and to make CRT display machine 3a indicate by GURAFIKU.

[0040] Therefore, since the abnormalities merely caused separately only are not analyzed and the number of times of generating of abnormalities, a generating place, generating time, etc. can be grasped statistically, while being able to study the cause of a heterology in a short time, it is useful also to selection of the important checkpoint in the check maintenance service of process-monitoring equipment, and the working capacity of a check maintenance service can be improved.

[0041]

[Effect of the Invention] ***** which retrieval time and a parameter are specified [*****] to be heterology memory for the heterology information memorized serially according to the alarm analysis equipment of this invention, and total analysis is performed [*****] as explained above, and carries out graphical display of the statistical heterology situation to display by easy operation for every facility and every unusual kind. Therefore, unusual cause investigation can be performed in a short time, and it can lecture on a precaution easily to the abnormalities caused periodically, and the mental burden of an operator or a maintenance control staff can be mitigated sharply, and the reliability of the whole process-monitoring equipment can be improved.

TECHNICAL FIELD

[Industrial Application] this invention relates to the alarm analysis equipment of the process-monitoring equipment which analyzes statistically each abnormality detected especially and carries out a display output, for example with respect to the process-monitoring equipment which supervises the process state of each facility which constitutes a plant.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram showing the outline composition of the process-monitoring equipment with which the alarm analysis equipment concerning one example of this invention was incorporated

[Drawing 2] The flow chart showing operation of this example alarm analysis equipment

[Drawing 3] The flow chart showing comprehensive display-processing operation of this example alarm analysis equipment

[Drawing 4] The flow chart showing trend-display processing operation of this example equipment

[Drawing 5] The flow chart showing manual-mode display-processing operation of this example equipment

[Drawing 6] Drawing showing the content of a display of the CRT display machine of this example equipment

[Drawing 7] Drawing showing the content of a display of the CRT display machine of this example equipment

[Drawing 8] Drawing showing the content of a display of the CRT display machine of this example equipment

[Drawing 9] Drawing showing the content of a display of the CRT display machine of this example equipment

[Drawing 10] Drawing showing the content of a display of the CRT display machine of this example equipment

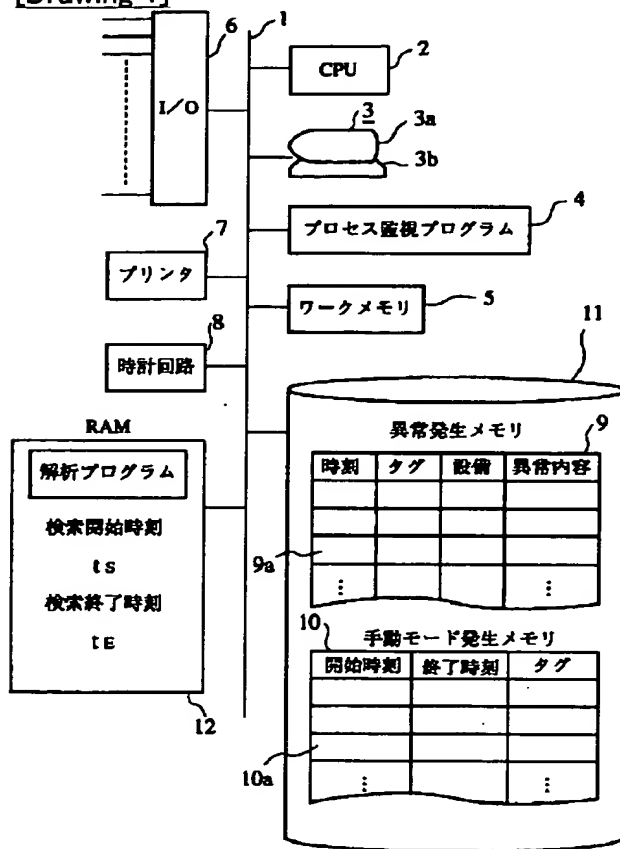
[Drawing 11] Drawing showing the content of a display of the CRT display machine of this example equipment

[Description of Notations]

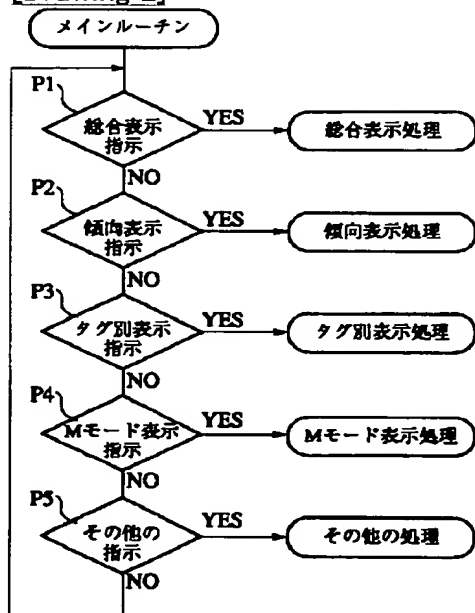
2 [-- A printer, 8 / -- A clock circuit, 9 / -- Heterology memory, 10 / -- Manual MORT generating memory.] -- CPU, 3 a--CRT drop, 3b -- A keyboard, 7

DRAWINGS

[Drawing 1]



[Drawing 2]



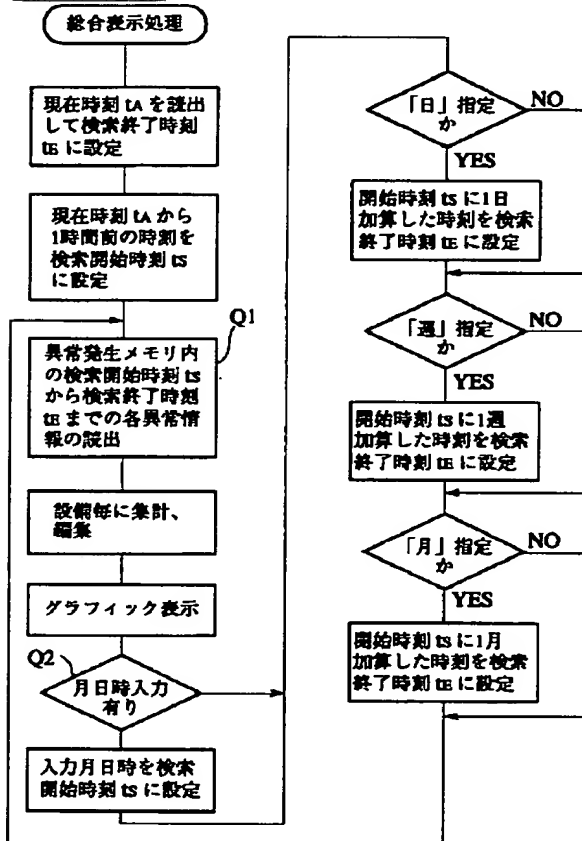
[Drawing 6]

設備名				異常発生累積数			
AAA	PH/PL	DV	ΔPV				
BBB	PH/PL	DV					
CCC	MH/ML	ΔPV					
...	*月*日*時から						

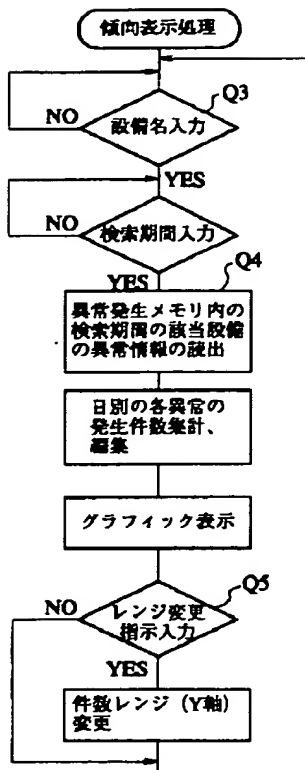
度
日
週
月

3a

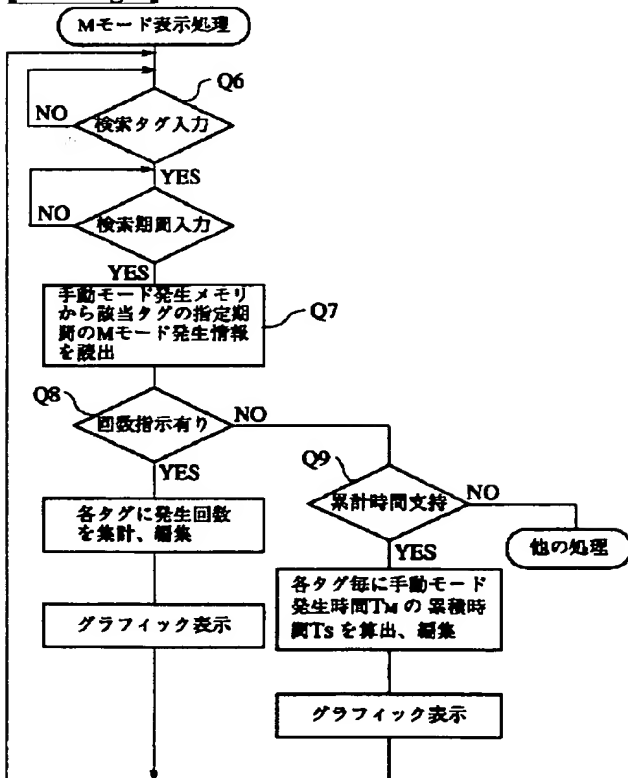
[Drawing 3]



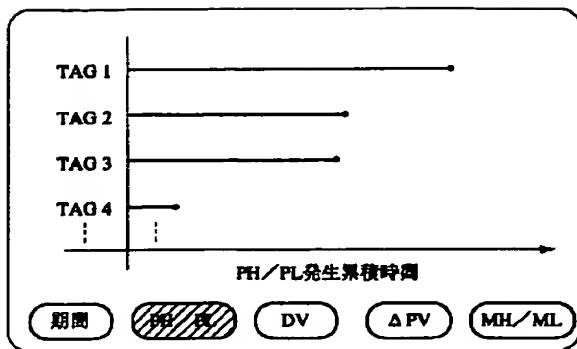
[Drawing 4]



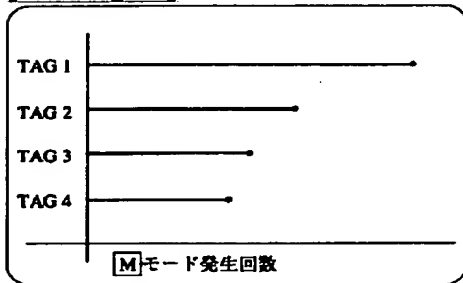
[Drawing 5]



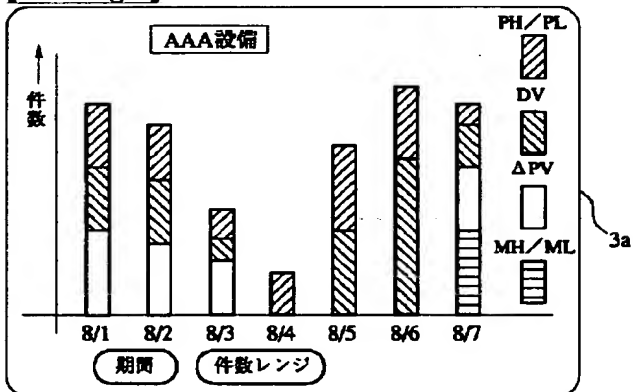
[Drawing 9]



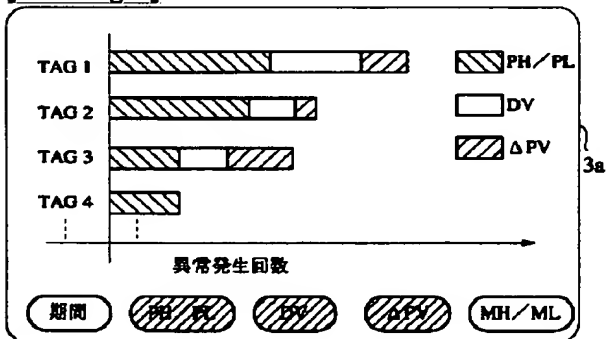
[Drawing 10]



[Drawing 7]



[Drawing 8]



[Drawing 11]

